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REORGANIZATION OF THE WORK OF THE FEDERAL GOVERNMENT[1]

THERE is one problem of the new administration that has received the attention and thought of the organized engineers of America for many years past. This is the problem of the reorganization of the federal government. The inadequacy, the wastefulness, and the inefficiency of our federal organization was evident enough under pre-war conditions. These inadequacies, these inefficiencies, these wastes were exhibited to the country during the war at the cost of millions.

Congress has placed the problem in the hands of a very able congressional joint committee. But if this joint committee succeeds in securing the imminently necessary results it will only be by full insistent support to it by public opinion. Many attempts have been made at reorganization before but all of them have gone to the same crematory— the interminable differences in opinion among the executive and legislative officials over details.

To any student of federal organization, one sweeping and fundamental necessity stands out above all others, and that is that the administrative units of the government must be re-grouped so as to give each of the great departments more nearly a single purpose. The hodge-podge of aims in certain administrative branches is scarcely believable when we consider our national pride and skill in organization. Such functions as public domain, public works, assistance to veterans, public health functions, aids to navigation, to industry, to trade, purchasing of major supplies, are each and every one scattered over from four to eight departments, most of which are devoted to some other major purpose.

[1] Summary of an address by Mr. Herbert Hoover, made at the dinner given in his honor by the Engineers' Club of Philadelphia, April 16.

Economies can be accomplished from a public point of view by an elimination of the overlap in these different units of administration through unification into groups of similar purpose. The real economy to the nation, however, does not lie here, however great this may be, but it lies in their more effective functioning in their daily relation to the public. The extra cost imposed upon business in general in the determination of the relation of any particular business to the different functions of the govenment, with the unnecessarily duplicating interferences and demands is a real charge on national wealth, probably as great in some directions as the actual costs of the administrations themselves.

Of equal importance with economy is to secure effective concentration of government effort into service to the community. No constructive vision or policies can be built around a national service directed by from two to ten cabinet members, more especially when this particular purpose is a side issue to all of them. No better example of this exists than the deplorable handling of our relations to our veterans.

There are other reasons that render reorganization imperative. The changed economic situation of the world demands that the functions of the government in aid to commerce and industry be given more concentration and wider scope.

The enlarged activities of the government as a result of the war greatly affect certain departments. The Treasury to-day as the fiscal office of the government must handle an annual budget of $5,000,000,000 as compared with $1,000,000,000 pre-war. Activities of the Army have increased from a budget of $200,000,000 to $400,000,000; activities of the Navy have increased from a budget of $125,000,000 to $425,000,000. Thus the burden and responsibilities for the major purposes of these departments have been enormously increased. I believe it is the consensus of opinion of the gentlemen conducting these departments that in the interests of efficiency they should not be called to responsibility for the administration of at least some of the matters not pertinent to their major functions which clutter their departments.

We have also some confusion between executive, advisory, and semi-judicial functions. One of the tendencies of government both local and national during the last twenty years has been to add executive functions to commissions and boards created primarily for advisory or regulatory purposes. It requires no argument with our business public that the executive functions can not rise to high efficiency in the hands of government boards where from the very nature of things each member has a separate responsibility to the public and is primarily engaged in a semi-judicial function.

Furthermore, during the last few years there has been a great growth of independent agencies in the government reporting directly to the president until his office is overburdened almost beyond the point of endurance. The original and sound conception was that the executive functions should be reported up to the president directly through his cabinet officials. Not only do these outside functions to-day overburden the president, but they render coordination with executive departments extremely difficult. It is neither possible nor advisable to place all these outside organizations into the departments, but much could be done to mitigate the situation.

One of the great steps in federal reorganization is the erection of a budget system, with its necessary reorganization of the congressional committees. There can be no doubt as to the early accomplishment of this great reform, but it will not serve its real purpose until the departments have been reorganized so that they represent a common purpose. Without this, congress will never have before it budgets showing the expenditure of the government in its relation to any particular function.

I have daily evidence in the Department of Commerce of all these forces. The question of governmental aids to navigation is not by any means one of the principal functions of our government, but it must be a sore trial

to the hardy mariner. He must obtain his domestic charts from the Department of Commerce, his foreign charts from the Navy Department, and his nautical almanac from the Naval Observatory—and he will in some circumstances get sailing directions from the Army. In a fog he may get radio signals from both the Navy and Commerce, and listen to fog horns and look for lights and buoys provided him by Commerce; if he sinks his life is saved by the Treasury. He will anchor at the direction of the Army, who rely upon the Treasury to enforce their will. His boilers and lifeboats are inspected by the Department of Commerce; his crew is certified by one bureau in commerce, signed off in the presence of another, and inspected at sailing by the Treasury, and on arrival by the Department of Labor.

It is possible to relate the same sort of story in our governmental relations to industry to our domestic and foreign commerce.

The moral of all this is that economy could be made by placing most of these functions under one head, not only economy to the government but to the mariner. Congress would know what it spends in aid to navigation and the government could develop definite policies in giving proper assistance and lastly could remove from the hardy mariner's mind his well-founded contempt for the government as a business organization.

The economic changes in the world, growing out of the war, and their reflex upon our trade and industry make it vital if we are to maintain our standards of living against increasing ferocity of competition that we shall concentrate and enlarge our national effort in the aid, protection, stimulation and perfection of our industrial and commercial life. There can be no real Department of Commerce or commercial policies to these broad purposes so long as the instrumentalities of the government bearing on these questions lie in half a dozen departments.

We want no paternalism in government. We do need in government aid to business in a collective sense. In a department we do not want to either engage in business or to regulate business. We need a department that can give prompt and accurate diagnosis from both a foreign and domestic point of view of economic events, of economic tendencies; of economic ills; that can promptly and accurately survey economic opportunity, economic discrimination and opposition; that can give scientific advice and assistance and stability to industry in furnishing it with prompt and accurate data upon production, supplies and consumption; that can cooperate with it in finding standards and simplifications; that can by broad study promote national conversation in industry and the elimination of waste; that can study and ventilate the commercial side of our power possibilities; that can study and advise national policies in development of rail, water and overseas transportation; that, in fact covers, so far as government functions can cover, the broad commercial problems of trade, industry and transportation. This can be accomplished more by coordination of existing governmental facilities than by increased expenditures.

THE AMERICAN ENGINEERING COUNCIL[1]

IN these days when societies multiply and increase it is a fair question to ask whether there is need for such an organization as the Federated American Engineering Societies. That many believe there is such a need is attested by the large number of societies that have already joined the organization and by the promise that others will come in. Aside from this, however, it is well to clear our minds as to just what the aims of this organization may be and what it may hope to accomplish. I am not unmindful of the vast amount of useful work that has been done by individual engineering societies in this country, not only in the somewhat varied lines for

[1] Address by Dexter S. Kimball, dean of the college of engineering of Cornell University and vice-president of the American Engineering Council, at the dinner given by the Engineers' Club of Philadelphia, April 16, in honor of Mr. Herbert Hoover.

which they have been specifically organized, but also in a broader way as affecting state and national issues. At the best, however, these individual organizations are concerned, for the most part, with service to the individual, and while not confined to such, these societies have been able to work in a broad way for the public welfare only through combined organization of some kind. All thinking engineers are aware of the inefficient manner in which much of the engineering and industrial features of our government, city, state and national, are conducted, and the experience of our local engineering societies in working for a better and more economical policy in the conduct of these affairs in cities, as well as the success that has attended such organizations, as the Engineering Council, in trying to assist on questions of broader scope all lead to the belief that a Federated Engineering Society, which can speak for all engineers in the important affairs concerning which we are justified in speaking, must be productive of beneficial results. It is almost axiomatic that in a nation such as ours where industry is the great factor of our existence these statements must be true. Industry is the life of our nation, and engineering is the backbone of industry. Surely if any class of men have a right, or better still, a duty, to band themselves together for the betterment of the fundamental industrial principles of our nation, engineers, using the term in a broad sense, have full justification for so doing. These are matters of common knowledge to all engineers and scarcely need to be defended or explained.

There is, however, a much greater and deeper reason in my opinion why we have need for a society of this kind. We are all prone to think that the problems of our day and date are peculiar and unlike any that have gone before. As a matter of fact, history teaches us just the contrary and a superficial examination of any of the great civilizations that have preceeded us will show that basicly they differ very little from the one that we now enjoy. The great fundamental principle of all civilizations is division of labor; at once the most effective tool that man has ever devised, it is at the same time the cause of his greatest difficulties. Because, wherever division of labor is employed, coordinated effort necessarily follows. We know of no civilizations built up by a single individual, though Robinson Crusoe is reported to have made a very good effort. Nor do we know of civilizations that were built up by a limited number of persons. Basicly, civilization is possible only where there is a wide use of division of labor accompanied by coordinated effort. But with coordinated effort comes always the difficult problem of awarding fairly and justly the fruits of labor, and from the beginning of time men have wrestled unsuccessfully with the problem of "what is mine and what is thine." As far back as we can read history we find industrial codes aimed at the solution of this difficult problem. The Mosaic code, based on a much more ancient Egyptian code, the remarkable code of Hamurabi and a still more ancient code recently discovered, all bear witness that this problem is very ancient indeed and has always been the one great problem incident to the use of division of labor and the building up of a civilization. The solutions offered by these ancient codes are for the most part of a legal character, often very arbitrary and intended more as a means of keeping the peace rather than as a solution of the problem on the ground of merit and justice. And to a large extent we have inherited these viewpoints in our modern industrial codes.

Wherein does modern industry differ from these ancient civilizations? The advent of the modern machine era and the extension of the use of scientific methods have carried division of labor to a degree undreamed of by our ancestors a few hundred years ago. If the ancient civilizations were complex ours is infinitely more so and the difficulty of defining "what is mine and what is thine" has increased many fold.

And the solutions we have been offered for this problem are many and curious. The advocates of single tax, prohibition and women's rights, of various kinds of tariff,

of various schemes of taxation are all quite sure that if their measures are enacted the millennium would be here. If the ancient civilizations were complex ours is chaotic, and further extension of our complex industrial system makes this personal problem more and more difficult.

Out of this chaotic condition, however, three viewpoints to-day stand out above all others and are well worthy of carful consideration. The first is the conviction that is rapidly taking root in the minds of thinking men that industry should be considered a means of supporting the human race, and not as a means of personal corporate or state profit: the conviction furthermore that all men are entitled to a certain amount of physical, mental and spiritual well-being, and that the nation which can develop such well-being is the one that will endure.

The second is a conviction that no adjustment of these difficult industrial matters can be enduring that is not based upon justice. It is true that justice varies with time and place, but whatever stands for justice at the time and place considered, is the only basis on which enduring industrial adjustment can rest. This conviction differs from the old legal viewpoint quite markedly, and it is well illustrated in our changed point of view concerning accident compensation. For hundreds of years accident compensation was based on legal verdicts inherited by us from old English common law and having sometimes little to do with justice. The modern compensation law is an effort to adjust these matters on the ground of justice and the fair deal.

The third conviction is that there can be no justice where there is no knowledge. Any one who has read carefully the history of industrial disputes during the last few years can not fail to be impressed with the truth of this statement. Wherever a wide knowledge of fact can be obtained, adjustments usually are not difficult, but an enduring adjustment can never be accomplished where facts are not known.

What has this to do with the work of the engineer? A very great deal indeed. A few years ago the engineer was looked upon as one who built and designed machines or structures. With the growth of his technical and scientific background it has become necessary for him to assume the management of industry and to-day he stands as the foremost figure in industrial management. This has brought him for the first time in close touch with the human element of industry and face to face with the great problem of the distribution of wealth. Up till recent times he was not expected to know of these matters and much less was he expected to have any wise ideas as to the solution of the problem. It should be remembered, however, that the engineer in thus enlarging his field has brought with him the most powerful mental tool that the human has devised, and which we call commonly the "scientific method." With this method he has conquered and subdued nature. At the present time he is teaching the human race a better and more efficient means of organizing industry. It remains to be seen whether he can apply this method to the solution of the old time problem of "what is mine and what is thine." It should be remembered that this problem has been wrestled with by many able minds but it will also be remembered that many of those who have given much time and thought to these problems did not have the intimate knowledge of industry, and of those who work in industry that is the possession of the engineer to-day. If he undertakes the solution of this problem with the same energy and vision that he has applied to fields that he has already conquered, I am hopeful for the result.

I see, therefore, in the Federated Engineering Societies something more than an organization to assist city, state and nation in the solution of technical problems. I see in it an opportunity for the engineer to study and to solve the last remaining problem of civilization. I see in the society a means of gathering data on the industrial problem such as we have not possessed and in general of obtaining that knowledge, which as I have

already indicated, is absolutely essential to this great problem.

And I am not without hope that the engineer will qualify for this work. There are many indications that their ideas are stirring in the minds of forward-looking men. At the last election Mr. James Hartness, well known as an engineer and inventor, was elected to the Gubernatorial chair of the State of Vermont, an honor, so far as I know, that has never before been conferred upon an engineer. And it was with the greatest satisfaction and pleasure that engineers, not only in this country, but elsewhere, viewed the selection of Mr. Herbert Hoover as Secretary of Commerce. These are pioneer workers in a field hitherto controlled by the lawyer and the politician, and their progress will be watched with the keenest interest and sympathy by all engineers. Of the success of their mission no engineer has the slightest doubt, for we are well aware that these men will bring to the problems of state the methods that have enabled the engineer to subdue nature and build up civilization.

Can there be any question that back of a movement as great as this we need an all-embracing Society of Engineers; a society whose business it will be to foster the solution of the great problems of industry which are the problems of the engineer. The functions of such a society will differentiate sharply from those of an individual society in that as before stated, the individual society is more likely to deal with service to the individual. This society is organized for service to the nation. It is a challenge to national service. There is no question in my mind that it has a bright future and is worthy of the support of engineers of all kinds and in all places.

PLAGIARISMS

There have been published in recent numbers of Science[1] communications from correspondents more or less involving the interest which revolves around what we are apt to call plagiarism. They are concerned for the most part with matters of not very serious import in scientific circles and the communications are marked by courtesy and good humor. These amiable features are sometimes absent in the more earnest and specialized realms of research and the whole subject is only too often conducive to unfortunate and wearying controversy and to permanent and deplorable enmities between the best of men and those least likely, one would think, knowingly to rob a fellowman of credit for original work. One not himself drawn into the heat of such conflicts is often led to believe that a more thorough understanding of some of the implications and correlations, a more just appreciation of the numerous underlying springs which move the human mind would modify it. A more constant keeping in view the history of science, a realization of how numerous are the expositions of facts, before the world becomes attentive even to the most obvious of them, would cause these deplorable incidents to become less frequent. The character of the recent outbreak in Science was mild and it was devoid of bitterness, as most incidents are which present such examples of the humor and worldly common sense of the participants, as these communications do. The chances of unfortunate consequences being remote it is perhaps an opportune time to say something of the broader aspects of the subject of plagiarism.

Its wide affiliations are best appreciated in an analysis of the underlying principles to which I have referred. Many will be disposed to criticize what may seem the too wide significance I give to the term. Many look upon it only as one of evil import. However, it is easier to expand its usual limitations a little than to find or invent a name which after all would only here and there overlap the commonly accepted outlines of the usual term.

Its most sinister acceptation interests us but little. When a man affixes his name to a long essay or a book which another man has written it would perhaps be better to call it thievery. I remember one such instance

[1] Science, January 14, 1921; February 11, 1921; March 4, 1921.

occurring many years ago. I only introduce reference to it here because I am reminded that in defense of the quite undeniable fact there was advanced an explanation which sometimes, in less flagrant cases, has to be seriously considered. The culprit when convicted pleaded that he had imbibed the author's ideas from lectures he had heard him deliver and essays of his he had read, so that when he came to write these unconsciously flowed from his pen. This too is one of the implications of plagiarism, but alas! in this particular instance it was a question not of ideas—these were in no way notable—but of two or three thousand words repeated in the same sequence, certainly a monstrous accomplishment for the subconscious. With this aspect of plagiarism I am not here concerned, as I am not writing on the underlying causes of crime.

Where indeed shall we draw the line between a peccadillo and crime? At a not very remote period in the past there was no patent law, no copyright, far less any code punishing purloining even of words to say nothing of ideas. There seems only comparatively recently to have arisen a public opinion condemning such transgressions. They were once scarcely censurable. In the time of the Renaissance there was an entirely different point of view. Their equivalent for research was then the digging up of buried treasure out of ancient literature. This was so universal that it seemed a sort of affectation to be bringing in allusions to the derivation even of transliterations from ancient authors, forcing on the reader, as it were, the recognition that the writer was accurately and intimately acquainted with ancient models. It was taken for granted of any idea or incident that some Aristotle or Plato or Pliny had originated or transmitted it. Why bore the reader by continually reminding him of it? Indeed such impatience occasionally becomes vocal in the modern reader from this annoyance. Among the ancient authors Pliny was the only one who grouped his references in separate bibliographical categories. He alone, so far as I know, in his "Natural History" went about the matter in a way that approaches our systematic bibliographies, and he took good care to save the reader from the weariness of continual textual indications of the sources of his astounding statements. Any story, however good, any lesson, however valuable, any humor, however infectious it otherwise would be, is apt to evaporate under less careful supervision. The literature of the subject is what the rushed researcher today first skips, the details next and the "conclusions," least of all. The form of a modern research article at best is a grisly horror. I do not know if the man has been born yet who can avoid bibliography, details and conclusions, and yet have his essay stand forth in shining attractiveness in its exposition of original work in science. One sometimes wishes to be born again when that blessed time is a reality. It is therefore hardly fair to group the conventional essay of modern science with real literature. The real masters of science sometimes approach it; they very rarely indeed attain it.

But in order to pursue our inquiry into the nature of plagiarisms, it is in general literature for the most part we must seek our illustrations. When Molière wrote his comedy "Le Médecin Malgré Lui," he put in the mouth of his own characters the discourse, found in Rabelais, of Panurge, as to the man who had married a mute wife. It is not worth while to pursue the joke further backward, as we shall find other illustrations easily enough, but those who saw Joe Jefferson play "Rip van Winkle" in Boucicault's adaptation of Irving's tale will remember the soliloquy of Rip on the mountain as to the vision of a happy married life, excited by the contemplation of the mute dwarfs he met there. Petrarch furnished Molière with other scenes, not the ideas alone but a considerable stretch of word for word translation. I have traced this back, not quite so literally perhaps, to Pliny and evidently through him to Pindar. The ancient Greek legends represent the complaint of Zeus finding practical executive attention in the smiting of Æsculapius for transgressing the permissible limi-

tations of his art when he resurrected the dead. Later the complaint of Pliny and Petrarch also was that the doctors took unethical liberties with their opportunities. Pindar, Pliny, Petrarch, Molière, even Dr. Rabelais himself by inference, lash the doctors with the bitterest invectives for transgressions, some of which we admit to-day are daily committed against the ethics of the profession. It becomes stereotyped in Pliny, Petrarch and Molière.

> Whether well done or badly done it is always paid alike. . . . A shoemaker in making a pair of shoes can't spoil a piece of leather without paying for it, but at this business when we spoil a man it does not cost us a cent.

Even Socrates has the same jibe put in his mouth by Plato, and to this Petrarch manages to allude, but to our unwritten modern ethical standards it is all flagrant plagiarism. As to medicine much of this continual abuse of it in ancient and modern satire is due to the underlying vice in its social regulation. It is the sole one of human activities wherein its practitioners are admonished, nay forced so far as possible, to work directly against their own material interests. No punishment is too severe, if we could only get at him, for the criminal who tries to further his commercial interests by the unnecessary worry and botheration to a patient, whom nature is better able to treat than the doctor. Is there any doubt of the occasional justification for such complaint? What is there against the other impostors of commerce? For them such conduct is ethical business. As for medical men attempting to stimulate their business by setting plagues agoing, that is unthinkable. Indeed the evolution of public health preservation is making daily more clear the anomaly of this age-long status of practitioners of medicine, and daily one sees more or less abortive attempts in the direction of change. Now the underlying cause of all this plagiarism in the satires and jibes against the doctors is the broad one of maladjustment of a certain social agency. It is the continued protest of society, falling into fairly narrow channels of expression it is true, but it is also true that no one censures Molière or Petrarch, or ever did censure them for using ancient jokes and jibes as their own.[2]

Now the thread that runs through the stories of the effect wrought on the layman's mind by comparing the ideas aroused by viewing for the first time other worlds than ours through the telescope is that which the preacher seizes to emphasize the glory of God and the insignificance of man, whom he has created. That has been dinged into the consciousness of countless generations of men, ever more insistently, as modern science has made it more and more manifest. The suggestion of a parity becomes daily more grotesque. This grotesqueness finds frequent issue in words and it is not difficult to imagine that even the words are closely similar, when the humor of the thought strikes the same spot in the observer's mental machine.

Let me take a more concrete example. Does any one suppose that when Mark Twain wrote the extremely amusing dialogue in Tom Sawyer Abroad between Nigger Jim and the hero he was plagiarising Pliny? The former had a poor opinion of painters. One of them "was paintin' dat old brindle cow wid de near horn gone—you knows de one I means. . . . He say when he git her painted de pictur's worth a hundred dollars. Mars Tom, he could a got de cow for fifteen." So Pliny's barbarian Gaul with the long hair, when at Rome was asked on his glancing at a masterpiece of an old slave leaning on his staff what he would give for it in cash. "I would not give a farthing even for the slave"[3] was his contemptuous reply. It is apparent that such a joke is always lying close to the surface through all the ages since man made his drawings on the walls of the dark caves at Altamira and that is the way with the joke about the stars.

Lawyers are always writing to the astronomers for knowledge of when the moon might

[2] "Ancient jibes at the doctors," *New York Medical Record*, September 12, 1903.

[3] Pliny, "Historia Naturalis," Liber XXXV., 8 Ed., Silling, Vol. V., p. 211.

have revealed or when it could not have revealed crime to the night-wandering witness. There is nothing remarkable that Lincoln should have cornered his witness as well as Alcibiades by a device that lay near the surface ever since man became a sublunar biped. But neither is there anything remarkable, indeed I believe the biographies assert it as fact, that Lincoln in his youth was a reader of Plutarch's lives, possibly of Chamber's "Book of Days" too, where one can meet with the same tale. At any rate the stories always amuse, when first met with, and wherever met with often instruct. They should not be suppressed by uncharitable charges of plagiarism, because it does not seem worth while, even if the charge is correct, to spoil the story and wipe out its humor by the introduction of clumsy and pedantic references.

The interest in anthropological problems as well as in those of ethnology is so specialized and within their own lines is so absorbing that the light psychology might throw on them has been somewhat neglected—very much so until very recently. And yet Tylor's ground thought was that psychology plays a large part in anthropology even if the human mind is everywhere ab initio of the same nature. He, or some of his followers at least, are not even disposed to allow as much fundamental differentiation as they apply to the shape of the skull or that of the nose. However that may be they have compelled us to acknowledge that it reacts very much in the same way to the same environment and the same stimuli and this places us at once in view of the link, some may think rather tenuous, which attaches ethnology to plagiarism. I hope with the expansion I have given to that term, in what has preceded, this is at least discernible. I tried once to show[4] that, starting with primitive man's idea of disease etiology, the demons of disease became those of heresy or their first cousins, and inasmuch as a good purge was a good way to get rid of disease devils, so it was also for false doctrine, vile thoughts, evil emotions, pride, jealously, injustice. So early and so firmly bound together in this channel in all the languages of modern civilized races became the association that "purge" still persists in them all as applied to mental and religious and legal categories ages after the devils of disease had disappeared from medicine, a quite grotesque and absurd correlation between widely different concepts in modern thought. One stares with surprise, both in Pliny[5] and in Schoolcraft's[6] account of American Indians, at the menstruating woman going around crops naked at night to chase away the vermin from the corn, or was it in both cases some fertility rite that was observed and misinterpreted? We are scarcely less astonished to find the plumed serpent in American aboriginal religion more or less closely paralleling that of the Asiatic. I do not know if any hooded snake may have existed or may still exist in America to account for this detail of coincidence, very astonishing unless we think of the same environmental influences in India and America. We get no trace of the deadliness of anything resembling that of the cobra as having ever moved the mind of man in America to stand in awe before its power and worship it. But whether the American savage brought the plumed snake from eastern Asia in medicine bundles across the Straits of Behring or across the Pacific or whether his imagination created the coincidence, still we see two of the principles prominently associated with plagiarism here in this distant ethnological territory brought into play. One is the persistance with which the mind moves in channels once entered, the other is the promptness with which it enters those channels once it is placed in a certain environment. I fancy this exemplification torn with some violence from a foreign field is helpful in making us realize how the tendency to plagiarism is one deeply, immutably rooted

[4] "The Demons of Heresy and the Demons of Disease in the Processes of Thought," *New York Medical Journal*, February 23, 1918.

[5] Pliny, "Historia Naturalis," Liber XXVIII., Ed. Sillig, Vol. IV., p. 277.

[6] Schoolcraft, Henry R., "The Indian Tribes of the United States," Part 5, p. 70.

in the human mind and though some may be disposed to say this is nothing but another word for original sin, I am sure most will rather be disposed to believe that a very large amount of the so-called plagiarism can be traced to sources quite outside the volitions and intentions of the transgressor.

Notwithstanding this, some may consider, extremely charitable view which we should all take when confronted with evidence that seems a little disconcerting at times, it behooves us all, when we think we have a bright new idea, or a brand new joke, or a bit of new truth laboriously unearthed in research, to search our inner consciousness as well as our environment for the origin of it. At any rate worldly wisdom should teach us not too rashly to forget the precaution of leaving the way open for the claims of others which we may have unintentionally overlooked.

Jonathan Wright, M.D.

CONSERVATION CONFERENCE ON RESOURCES OF INTERIOR WATERS

As indicated by a recent preliminary announcement, Hon. Herbert Hoover, secretary of Commerce, has called a conference at the Fisheries Biological Station, Fairport, Iowa, June 8–10, 1921, for consideration of the conservation of resources of interior waters.

Acting under instructions from Mr. Hoover, the Committee on Organization and Plans has prepared the following outline of the scope and character of the conference.

It is assumed that our water courses, our lakes and ponds not only should serve as avenues of transportation, and channels for removal or reservoirs for storage of surplus surface drainage, but should also continue to provide food and other necessities of life and to furnish the means of essential recreation. It is evident that, with growth in population and with progressive industrial development, the public waters are becoming decreasingly fit to serve these latter ends. It is important, then, to ascertain if the decline in usefulness of the waters is inevitable, and, if it is not, to discover and apply the means of bringing about improvement. There is a certain community of interest among groups (anglers, commercial fishermen, sanitary engineers and others) that are commonly conscious only of special interests, but as yet there has been no unity of purpose, no concert of effort to serve a common interest. It is certain that the accomplishment of the purpose of each group is conditioned, not only upon public sympathy and support, but upon the cooperative service of scientists representing biology, chemistry and physics, and engineers representing sanitation, hydrology and navigation.

That the conference now called should be as constructive and practical as possible, it is proposed to concentrate attention upon the following principal topics: (1) the depletion of fish and shellfish, its causes and possible remedies; (2) the preservation, value and appropriate utilization of swamp and shore areas; (3) the organization of effort to secure an early beginning upon a constructive program of betterment.

It is believed that the conference may be most effective in accomplishing its ends if it be the occasion, not for a few special addresses, but rather for informal and free discussion from every point of view. It is proposed that on each day there shall be two sessions, morning and afternoon, respectively, with ample intervals between sessions for personal interviews, demonstrations or recreation. Opportunity will be afforded in the evening for special meetings to disclose topics of interest to particular groups or to all. As no talk is expected to exceed ten minutes, opportunity is allowed for the most open discussion. Following is the outline of program:

Wednesday, June 8. 10 A.M. and 2 P.M.

Subject: Depletion of aquatic resources, causes and remedial measures (including principles rather than details of legislative protection). Discussion from the standpoint of the sportsman, the commercial fisherman, the dealer or manufacturer, the biologist, the fish-culturist and the sanitary engineer.

Wednesday evening is left open for special topics arising in course of the discussion of the day.

Thursday, June 9. 10 A.M. and 1:30 P.M.

Subject: The value of swamp and shore areas and their utilization as fish and game preserves, for the cultivation of aquatic animals and plants, as reservoirs of food for aquatic animals, and as nurseries for young fish. Consideration may also be given to the additional value of submerged lands in relation to food control, forestry, agriculture and sanitation.

On Thursday evening there will be a special meeting for consideration of the opportunities and needs of research stations.

Friday, June 10. 10 A.M. and 2 P.M.

Subject: Organization of effort to determine what plans of procedure may be immediately followed to further progress in conserving resources of interior waters.

The discussion may be from the points of view of cooperation in scientific research, the training of men to prosecute investigations, the education of the public, the reconciliation of conflicting group interests, the union of effort to secure adoption of appropriate conservation measures, and the possibility of periodic gatherings for promotion of harmonious action.

Through the cordial cooperation of a local committee, special arrangements will be made for utilization of the intervals between meetings in interesting demonstrations pertaining to the topics of the conference, in trips to neighboring points of interest, or in other means of diversion and recreation.

Throughout the conference meals will be served at a small charge based upon actual cost in the dining room of the Biological Station. Lodging without charge will be available in the laboratory or in tents or other temporary quarters. The nearest hotels are found in Muscatine, Iowa, a distance of 8 miles and Davenport 20 miles from Fairport.

All persons expecting to attend are advised to communicate in advance with R. L. Barney, Director of the Fisheries Biological Station, Fairport, Iowa, or J. E. Krouse, Davenport, Iowa, Chairman, Local Committee on Arrangements, in order that suitable reservations may be made for accommodations.

R. E. COKER,
V. E. SHELFORD,
J. E. KROUSE,
A. S. PEARSE,
F. A. STROMSTER,
R. L. BARNEY,
Committee on Organization

SCIENTIFIC EVENTS

THE AMERICAN ENGINEERING COUNCIL AND MR. HOOVER

THE American Engineering Council of the Federated American Engineering Societies met on April 16 at the Engineers Club of Philadelphia. Members attending were: Herbert Hoover, president; Calvert Townley, vice-president, representing A. I. E. E.; J. Parke Channing, vice-president, representing A. I. M. M. E.; E. Ludlow, president A. I. M. M. E.; F. J. Miller, past president A. S. M. E.; M. L. Cooke, Taylor Society; Wm. McClellan, A. I. E. E.; A. S. Dwight, A. I. M. M. E.; A. M. Greene, A. S. M E., dean of the School of Engineering, Troy Polytechnic Institute; S. H. McCrory, A. S. Agricultural Engineers; W. W. Varney, Baltimore Engineers Club; J. F. Oberlin, Cleveland Engineering Society; O. H. Koch, Technical Club of Dallas; D. S. Kimball, vice-president, dean of School of Engineering, Cornell, A. S. M. E.; Gardner S. Williams, Engineering Society of Grand Rapids; C. F. Scott, A. I. E. E., School of Engineering, Yale University; W. B. Powell, Buffalo Engineering Society; W. E. Rolfe, vice-president, Associated Engineering Societies, St. Louis; L. B. Stillwell, A. I. E. E.; L. P. Alford, A. S. M. E.; H. W. Buck, past president A. I. E. E.; E. S. Carman, A. S. M. E., Cleveland; Philip N. Moore, A. I. M. M. E., Washington.

Mr. Hoover resigned the presidency, giving as his reasons the fact that the American Engineering Council by its constitution was necessarily engaged in furthering national activities which involve legislation; and that he as a member of the executive branch of the government could not consistently direct such

activity as an officer of the council. The council, in a resolution of regret at Mr. Hoover's retirement, voted its appreciation of his leadership during the organization period of the council and his initiation of policies and effort.

A dinner, arranged in honor of Mr. Hoover by the Engineers Club of Philadelphia, representing more than 4,600 engineers in the Philadelphia District, was the culminating event of the meeting. Guilliaem Aertsen, president of the club, presented Mr. Hoover with a certificate of honorary membership, which read: "The Engineers Club of Philadelphia, by unanimous vote of its directors, in council, the eleventh day of November, 1919, desiring to express its fullest appreciation of the eminence attained by him in the field of engineering, and his great service to humanity, hereby confers upon Herbert Hoover honorary membership with life tenure of all the rights and privileges thereto belonging."

The addresses made by Mr. Hoover and Dean Dexter S. Kimball, of Cornell University, are printed above. Speeches were also made by Wharton Pepper, Esq., Col. William A. Glasgow and John C. Trautwine, Jr.

THE CLASSIFICATION AND SALARIES OF GOVERNMENT EMPLOYEES

A BILL providing for reclassification of government employees was offered in the Senate on April 18 by Senator Smoot of Utah. The bill has been drafted by Senator Smoot after a conference with other members of the senate appropriations committee and with efficiency experts of the government.

The bill provides eighteen grades in the government service, with salaries ranging from $360 to those above $7,500. It is provided that the head of each department and establishment shall, under rules and regulations prescribed by the president, allocate the positions in each department or establishment to grades in accordance with the schedule contained in the bill.

The head of each department and establishment within the salary range of the popular grade will determine the salary to be paid each employee by comparing his efficiency with the average efficiency of all employees assigned to the same work, or, if no other employees are engaged upon the same or comparable work, by comparing the efficiency of the employees with the efficiency which reasonably should be expected.

The salaries of all employees in each department or establishment fixed in accordance with the proposed law shall become effective on the first day of the third month following the date of approval of the act, and no employee shall thereafter be paid a salary exceeding the maximum rate or less than the minimum rate prescribed for the grade to which his position is allocated.

The upper eight grades are defined as follows:

Grade 11—Salary range, $2,460 to $3,000. The number of classes of employment is eighteen, ranging from supervision of and laying out of the work of a group dealing with tariff rate questions to the engraving on copper plate of topographic maps or similar work where there is much technical detail, repairing defective and worn plates.

Grade 12—Salary range, $2,700 to $3,300. The number of classes, seven, ranging from responsibility for the accounting work of a small government accounting organization to the construction and suggestion of improvements and new designs in instruments of precision, requiring familiarity with practical astronomy.

Grade 13—Salary range, $3,000 to $3,600. The number of classes of employment, eleven, ranging from the supervisor of an entire system of accounts in a large office to the administrative control over the clerical force of a large independent establishment or a major bureau or division of a department.

Grade 14—Salary range, $3,300 to $3,900. Three classes of employment, directing editorial work of a department and being responsible for the conduct of a minor subdivision of a technical, scientific or professional organization, and designing and constructing instruments of precision.

Grade 15—Salary range, $3,600 to $4,500. The number of classes, ten, ranging from the supervision and responsibility for accounting work of an organization requiring extensive accounting operations to the responsibility of receiving and

paying money in one of the largest government organizations.

Grade 16—Salary range, $4,500 to $5,700. The number of classes of employment, five, ranging from general supervision over design and installation of accounting systems to administrative control of the clerical force and responsibility for the general business operations of one of the largest departments.

Grade 17—Salary range, $5,700 to $7,500. Two classes, chief law officer of a department, commission or other independent government establishment, and having responsible charge of a major subdivision of a technical, scientific or professional organization.

Grade 18—Salary range, all above $7,500. Employments include all technical, scientific, professional and executive employments whose characteristics and requirements are superior to those in the lower grades. No salary in excess of $7,500 may be paid to any persons unless specifically authorized by Congress.

THE MUSEUMS AND COLLECTIONS OF YALE UNIVERSITY

THE Yale Corporation has approved the plan of the University Council for a permanent Committee on University Museums to include all officers in charge of museum collections and for the appointment of a corporation committee to meet this Committee on University Museums to consider "the relation of the museums and of their buildings to each other, the organization of the collections within the respective divisions and the functions of the Museums Committee."

A survey recently made shows that the various collections of the university, in addition to those of the School of the Fine Arts and the Library, are more extensive than is generally realized. The following list, the arrangement of which is tentative, shows the various collections and the names of their curators:

I. Natural History:
- Mineralogy—Dana, Ford.
- Geology and Invertebrate Paleontology—Schuchert, Dunbar.
- Vertebrate Paleontology and Osteology—Lull.
- Botany—Evans.
- Forestry—Record.
- Zoology—Coe.

II. Anthropological:
- General Anthropology—McCurdy.
- Peruvian Expedition Collection—Bingham.
- Musical Instruments—D. S. Smith.
- Military—Hoyle.

III. Oriental and Classical:
- Syro-Arabian—Torrey.
- Babylonian—Clay.
- Egyptian—Clay (acting).
- Ægean—Baur.
- Indian—Archer.
- East and Central Asiatic—Williams.
- Japanese—Asakawa.
- Numismatic—Newell.

IV. Fine Arts—Kendall.

V. Library—Keogh.

THE HECKSCHER FUND GRANTS OF CORNELL UNIVERSITY

THE Heckscher Research Council has recently announced its first series of grants, as follows:

To Professor Joseph Q. Adams, Jr., Ph.D., '06, a sum sufficient to secure a substitute for him for the first half of 1921–22 in order that he may be released from teaching and enabled to complete his "Life of William Shakespeare," on which he has been for some time engaged.

To Professor Charles C. Bidwell, Ph.D., '14, $2,500 to enable him to carry on cryogenic measurements, the money to be used to provide a substitute for carrying on his work during the first half of 1921–22 and to cover such additional expenses as the investigation may involve.

To Professor J. Chester Bradley, '06, a sum not exceeding $700 to cover the cost of preparing illustrations and otherwise completing a work embodying the results of investigations of the wing venation of Hymenoptera.

To Professor Arthur W. Browne, Ph.D., '03, $1,800 to enable him to engage a competent assistant for two semesters for investigations of certain problems in the field of the oxidation of hydrazine, especially in non-aqueous solutions.

To Professor Louis M. Dennis, $350 for the purpose of engaging an assistant from March 1 to July 1 to carry on investigations on the separation of the isotropes of lead by chemical processes. Also $2,000 for the purpose of engaging a well trained assistant for one year, to devote all his

time to the investigation of the preparation and properties of germanium and its compounds.

To Professor Frank L. Fairbanks, '10, $500 for the purpose of developing and completing a traction dynamometer.

To Professor Simon H. Gage, '77, and Pierre A. Fish, '90, $250 for colored plates needed in completing a work on the digestion and assimilation of fat in the human and the animal body.

To Professor Vladimir Karapetoff $200 or such part as is needed for an assistant and materials in carrying on investigations on mechanical aids in the design of electrical machinery and lines.

To Professors William R. Orndorff and Roswell C. Gibbs, '06, $2,525 to pay for the services of an assistant on half time during 1921–22 and on full time during the summer and for apparatus to be used by him in connection with the investigation of the absorption spectra of certain organic compounds.

To Professor Floyd K. Richtmyer, '04, a sum not to exceed $1,800 for an assistant for one year to devote all his time to investigations of the laws of the absorption of x-rays, and $1,000 for the purchase of apparatus.

To Professor Ernest W. Schoder, Ph.D., '03, a sum sufficient to provide a substitute for him during the first half of 1921–22 in order that he may prepare for publication the results of investigations in hydraulics made by himself and the late Professor Kenneth B. Turner, '03.

To Professor Sutherland Simpson $100 to enable him to continue his investigations into the functions of the thyroid and parathyroid glands.

To Professor Albert H. Wright, '04, $500 for investigations of the life history of North American frogs, toads and tree toads.

To Professor Virgil Snyder, '90–92 Grad., a sum not exceeding $1,200 to provide a substitute for him during the second half of 1921–22 and thus enable him to continue during that time his studies of algebraic correspondences.

To Professor Wallace Notestein $1,800 for an assistant during the summer and the year 1921–22 to help in his work of editing various historical documents in connection with the study of the Parliamentary history of England.

To Harry S. Vandiver $500 to support, during the summer, investigations on the subject of algebraic numbers.

These grants amount to about $20,725.

The council has postponed the consideration of all requests for grants in aid of publication until it is possible to consider in detail the whole subject of the publication of results of research and its relation to the purposes of the Heckscher Foundation.

SCIENTIFIC NOTES AND NEWS

The American Philosophical Society has elected members as follows: Herman V. Ames, Philadelphia; George David Birkhoff, Cambridge; John J. Carty, Short Hills, N. J.; Frank M. Chapman, New York; Henry Crew, Evanston, Ill.; Benjamin M. Duggar, St. Louis; John Marshall Gest, Philadelphia; Charles Homer Haskins, Cambridge; Lawrence J. Henderson, Cambridge; J. Bertram Lippincott, Philadelphia; Hideyo Noguchi, New York; Thomas B. Osborne, New Haven; Charles J. Rhodes, Philadelphia; Vesto M. Slipher, Flagstaff, Ariz.; David White, Washington.

Prince Albert of Monaco gave the evening address at the annual meeting of the National Academy of Sciences on April 23, and the address was followed by a reception in the U. S. National Museum. At the dinner of the academy on the following evening Prince Albert was presented with the Alexander Agassiz gold medal, awarded in recognition of his promotion of oceanographical research.

Dr. Albert Einstein, to whom Columbia University last year awarded the Barnard medal on the recommendation of the National Academy of Sciences, was present at the meeting of the academy, and responded to an address of welcome from President Walcott just before the adjournment of the Tuesday morning session. Dr. Einstein also spoke at the academy dinner.

Rear Admiral William C. Braisted, U. S. N., retired, former surgeon general of the Navy, has been elected president of the Philadelphia College of Pharmacy. He is this year president of the American Medical Association.

Dr. William S. Thayer, professor of medicine at the Johns Hopkins University and

physician-in-chief of the Johns Hopkins Hospital, has resigned.

PROFESSOR ERNEST W. BROWN, of Yale University, has been elected a correspondent of the French Academy of Science.

THE Vienna Medical Society at a recent meeting elected to honorary membership as token of gratitude for their efforts in promoting the public health of Austria, Mr. Herbert Hoover, of Washington, D. C., and Dr. F. Ferrière, the vice-president of the International Red Cross, at Geneva.

THE University of Dublin has conferred the honorary degree of doctor of science upon A. A. Michelson, professor of physics in the University of Chicago; W. M. Bayliss, professor of general physiology in University College, London, and E. Borel, professor of the theory of functions at the Sorbonne, Paris.

PROFESSOR C. S. SHERRINGTON, president of the Royal Society, has been elected a member of the Athenæum Club under the provision for the election of persons "of distinguished eminence in science, literature, the arts, or for public service."

THE Royal medals of the Royal Geographical Society have been awarded as follows: Founder's medal to Mr. Vilhjalmur Stefansson, "for his distinguished services to the Dominion of Canada in the exploration of the Arctic Ocean"; and Patron's medal to General Bourgeois, senator for Alsace, "for his long and eminent services to geography and geodesy." The council has made the other awards as follows: The Murchison grant to Commandant Maury, for his surveys in the Belgian Congo; the Bach grant to Miss Marian Newbigin, for her contribution to geography, particularly of the Balkans; the Cuthbert Peek grant to Captain J. B. L. Noel, for his reconnaissance of the eastern approaches to Mount Everest and other geographical work; and the Gill memorial to Lieutenant Colonel M. N. MacLeod, R.E., for his contribution to the theory of survey from air photographs.

DR. OSKAR KLOTZ, professor of pathology in the University of Pittsburgh Medical School, has been appointed representative of the International Health Board of the Rockefeller Foundation for medical research work and education of São Paulo, Brazil, serving as director of a pathologic institute.

THE Food Research Institute, established by the Carnegie Corporation and Stanford University with Dr. C. L. Alsberg, formerly chief of the Bureau of Chemistry, United States Department of Agriculture as director, has appointed, to be associated with Dr. Alsberg, Alonzo E. Taylor, professor of physiological chemistry at the University of Pennsylvania, and Joseph S. Davies, assistant professor of economics at Harvard University. The directors will have authority to determine the scientific policies of the Institute and the problems to be studied. Leland Stanford, Jr., University has appointed as an advisory committee Herbert Hoover, Julius M. Barnes, Dr. J. C. Merriam, J. R. Howard, Dr. William M. Jardine and George Reeding.

DR. A. S. HITCHCOCK, systematic agrostologist of the U. S. Department of Agriculture, leaves about May 1 for an extended trip to the Orient. He will visit the Philippines, Japan, China, Indo-China, Singapore and Java, returning about January 1. He will study the grasses of the regions visited and will gather data especially for a revision of the bamboos of the world.

PROFESSOR MARSTON TAYLOR BOGERT, of Columbia University, gave an address at New York University on April 13, on "Science and disarmament."

UNIVERSITY AND EDUCATIONAL NEWS

A MAINTENANCE fund of $30,000 a year has been promised to the Albany Medical College on condition that a similar amount is raised each year by the trustees. The Rockefeller Foundation will give $20,000; the General Electric Company $5,000, and Dr. Charles Alexander Richmond, president of Union University, $5,000. The money this year must be raised by June 1 to make the $30,000 available.

IT is announced that the Ontario government will give immediate financial aid to the universities of the province as follows: University of Toronto, $900,000; Queen's at Kings-

ton, $325,000; the Western at London, $200,000.

The Pennsylvania State College has received from the children of the late J. Roberts Lowrie the gift of his herbarium. The collection comprises 2,750 mounted varieties representing 144 families and 707 genera.

With a portion of the funds at their disposal the trustees of the Captain Scott Memorial Fund have decided to establish a Polar Research Institute in connection with the new department of geography in the University of Cambridge.

The exchange agreement, established before the war, between Buenos Aires medical schools and Paris schools, has been renewed. In August of this year Professors Marcel Labbé and G. Brumpt will go to Buenos Aires to give lecture courses. The Buenos Aires school will send to Paris either heads of clinics or laboratories to take postgraduate courses in Paris.

The board of trustees of the Armour Institute of Technology has announced the appointment of Howard M. Raymond as acting president of that institution to fill temporarily the vacancy caused by the recent death of Dr. F. W. Gunsaulus.

Frederick H. Sibley, formerly professor of mechanical engineering at the University of Kansas, has been elected dean of the college of engineering at the University ofNevada. The college includes the four schools of civil, electrical and mechanical engineering and the Mackay School of Mines.

Dr. Oskar Bandisch, formerly privat-docent in the University of Zurich, has accepted an appointment as research associate in biochemistry in Yale University. Dr. Bandisch received his training in organic chemistry at the Technische Hochschule in Zurich under Professor Baumberger, and has contributed much original work dealing with problems of plant assimilation and the influence of light on chemical reactions. His work at Yale will be entirely in the graduate school.

Dr. Shepherd I. Franz and Dr. R. A. Cutting, respectively professor and associate professor of physiology at the George Washington University Medical School, have resigned.

DISCUSSION AND CORRESPONDENCE

ON THE USE OF THE TERMS "DENUDATION," "EROSION," "CORROSION" AND "CORRASION"

In 1911 J. W. Gregory called attention to the looseness with which the above terms were used in geological and geographical literature,[1] and suggested certain restrictions in their meanings. Although the confusion in the use of these terms has been generally appreciated by geologists, Gregory's suggestions have met with little favor, and no effort seems to have been made to bring about a uniformity of usage. In fact, a review of various text-books which have appeared since the publication of Gregory's article indicates that the confusion is growing worse.

While the definitions suggested by Gregory are open to strong objection, yet the existing ambiguity in the use of such important geological terms can not fail to be bewildering to students and authorities alike, and calls for some remedial action. A few quotations taken at random from recent text-books will emphasize this fact.

1. According to Tarr and Martin[2] denudation consists of weathering plus erosion, and erosion is further defined as involving "removal, transportation and deposition of rock fragments," though on p. 115 erosion is spoken of as the combined work of corrasion and corrosion, no mention being made of deposition. These authors apparently define corrasion as the mechanical degradation of rock by river water, and corrosion as the chemical removal of *solid* rock (pp. 114, 115) though the definitions are not at all clear.

2. Pirsson[3] limits erosion to "the formation of rock débris and its removal" and gives no definition of denudation. Corrasion he defines as the action of a stream in rasping

[1] *Geographical Journal*, Vol. 37, 1911, pp. 189–195.

[2] "College Physiography," 1914, p. 18.

[3] Pirsson and Schuchert, "Textbook of Geology," 1915, p. 31.

away the country rock *beneath* and *beside* it, "thus cutting an ever-deepening trench" (p. 37).

3. Cleland[4] refers to the confusion in the use of the terms corrasion, abrasion, corrosion, erosion and denudation in a footnote on pages 83 and 84, and then defines corrasion and abrasion as synonymous and meaning the detachment of rock particles as a result of wear; corrosion as the work done by solution; erosion as the sum of corrasion and corrosion, and denudation as a general term for the lowering of the land surface by any agency.

4. Grabau,[5] following Walther, defines erosion as clastation plus ablation, or the breaking up of rock material and its removal. Denudation is the removal of weathered and loose mantle rock and is a subordinate part of the process of ablation, which includes in addition corrasion, quarrying and corrosion. The former is defined as a "filing process" which may be accomplished by wind, running water, ice, waves or organisms, while corrosion is chemical removal by air (= evaporation), water, heat or organisms.

5. De Martonne[6] uses the term erosion in a broad sense but does not define it. Corrasion he limits to the wearing action of *wind*-driven particles, as typically illustrated in arid regions (pp. 660, 664).

6. Kayser[7] describes erosion as the mechanical work of water, and denudation as the sum of erosion and weathering, which latter term includes both chemical and mechanical action. Corrasion he defines in the same way as de Martonne (p. 240), both authors here following Walther and von Richthofen.

7. Park[8] defines denudation as "the wearing away, wasting, or breaking up of the land surface, whereby the general level of the land is lowered." Erosion, according to this author, is embraced within the term denudation and is somewhat vaguely defined as referring to "the more active and obvious wear and tear carried on by the sea, by streams, rivers and glaciers" (p. 15). Corrosion is "eating away of rock due to chemical solution, hence . . . is frequently used to denote chemical denudation" (p. 16). On page 34 the same writer refers to corrasion as "a variant of corrosion used by some writers to denote the vertical excavation performed by a stream," but recommends the use of erosion in its place.

The above quotations are only a few out of many and include only books published in the last ten years, yet they show an amazing divergence of views. This will be better illustrated by the following summary:

Out of a total of 7 authors quoted,

Denudation is defined by 5:
- as weathering plus removal, transportation and deposition of rock fragments; (1)
- as a general term for the lowering of the land surface by any agency; (2)
- as the removal of loose mantle rock (1)
- as weathering plus the mechanical work of water (1).

Erosion is defined by 6:
- as removal, transportation and deposition of rock fragments (1)
- as the formation and removal of rock débris (2)
- as the mechanical work of water (1)
- as rock wear plus solution (1)
- as the more active and obvious wear and tear performed by streams, rivers and glaciers and by the sea (1)

Corrasion is defined by 6:
- as mechanical degradation by rivers (2)
- as the detachment of rock particles by wear of any agent (2)
- as the wear caused by wind-driven particles (2)

One author rejects the term altogether, holding it equivalent to erosion.

Corrosion is defined by 4:

[4] "Geology, Physical and Historical," 1916.

[5] "Principles of Stratigraphy," 1913, pp. 17, 18.

[6] "Traité de Géographie Physique," Second Edition, 1913.

[7] "Allgemeine Geologie," third edition, 1909, Vol. I., p. 260.

[8] "Textbook of Geology," 1914.

as work done by solution (3)
as chemical removal by all agents (1)

Comment on these examples is scarcely necessary, but it might be added that this list does not by any means exhaust the definitions that might be quoted, as reference to Gregory's article will show.

The definitions suggested by Gregory are as follows:

denudation = the wearing down of the land by any agency whatever.

erosion = the widespread lowering of the land by wind, rain and weather, and by rivers and glaciers acting *laterally*.

corrosion = the excavation by rivers and glaciers of their beds.

corrasion dismiss as a synonym for corrosion.

These definitions are unsatisfactory in many respects. To separate the lateral and vertical degrading action of rivers and include only the former under the term erosion is not only unnecessary, but highly artificial. Indeed, a satisfactory definition of erosion will be an exceedingly difficult matter to accomplish, for the reason that the word has come to be used in two different senses: one broad sense in which it signifies the general process of the wasting of the land surface and is thus equivalent to denudation, as exemplified in the definition of Davis,[9] and a much narrower sense common in geological literature in such phrases as "ice erosion," "wind erosion," etc. The only solution of this difficulty would appear to be to use "denudation" for the general process and restrict "erosion" to the narrower meaning of gnawing or cutting away.

A general term for the action of rivers and glaciers on their banks and beds seems desirable, and for this purpose the word corrasion is much preferable to corrosion, since the latter has a distinctly chemical implication. There seems to be, on the other hand, no good reason for using separate terms for the lateral and vertical wearing action of streams and glaciers, since the adjectives lateral and vertical prefixed to corrasion would amply distinguish the two processes.

There would also appear to be room for the term corrosion as used by Grabau to denote the chemical removal of material by any or all agents, solution being a part of this general process, and confined to the action of water.

However these various terms be used eventually, the need of rescue from the hopeless confusion and ambiguity of the present is undeniable. The Geological Society of America found it advisable to standardize the nomenclature of faults; should it not also be the duty of that organization, or, better yet, of an International Congress of Geologists, to take official notice of the ambiguous meanings of the words denudation, erosion, corrasion and corrosion, and establish precise and authoratative definitions of these much-abused terms?

Malcolm H. Bissell
Bryn Mawr College

[9] Davis and Snyder, "Physical Geography," p. 105.

EUCLID OF ALEXANDRIA AND THE BUST OF EUCLID OF MEGARA

During the middle ages and later, it was the ill fortune of Euclid, the mathematician, to have been confounded with Euclid of Megara who lived about a century earlier and was not a mathematician. As if this confusion were not sufficient to tantalize mathematicians in general, another mistake came to be made, involving the same two Euclids. This time a bust found on a Greek coin, which according to numismatic authorities is really aimed to represent Euclid of Megara, came to be published broadcast as the picture of the mathematician of Alexandria. This happened in England where William Whiston, who was Sir Isaac Newton's successor in the Lucasian professorship of mathematics at Cambridge, brought out a school edition of Euclid containing as a frontispiece this bust, said to have been taken from a bronze coin once in the possession of Queen Christina of Sweden.[1] Unfortunately this same picture

[1] For the history of Queen Christina's Coin Collection, consult an article by Hugo Gaebler in the

which on the coin is circumscribed by the name ΜΕΓΑΡΕΩΝ, *i.e.*, of the Megarians, has been published in the United States as representing Euclid the mathematician. This unintentional historical misrepresentation appears in the publication, "A Portfolio of Portraits of Eminent Mathematicians" (1896), issued by the Open Court Publishing Company, in Chicago, a firm which in general has done as much as any other in America to advance a sound knowledge of the history of mathematics. The picture of Euclid of Megara is given as that of the mathematician, Euclid. In the memorandum accompanying the picture occurs the statement, "the name Megara is frequently coupled with his [name] on the early portraits as in this case."

The statement just quoted, in so far as it relates to the coin portrait in question, is in conflict with numismatic authority. A specimen of the coin referred to is in the British Museum and has been described by the great authority on coins, Barclay V. Head, who speaks of this coin as follows:[2]

> ΜΕΓΑΡΕΩΝ. Bearded head of the philosopher Eucleides of Megara, veiled and wearing ear-ring. . . . This remarkable type refers to the story that Eucleides attended the lectures of Socrates in the disguise of a woman, the Athenians having passed a decree that no citizens of Megara should be admitted within their walls. (Aulus Gellius, *Noct. Att.*, VI., 10.)

In his catalogue of Greek coins Head[3] quotes the Latin passage from Aulus Gellius, the Roman writer of the second century A.D., referred to above, who had studied at Athens. The passage tells the story of Euclid's going to Athens disguised in a "tunica longa muliebri" to attend the lectures of Socrates and of his returning to Megara the next day in the same disguise. In this book Head gives the date of the coin as "Cir. 146 B.C. or later"; in his *Historia,* quoted above, he gives, "Imperial Times?". While Head thus expresses uncertainty as to the exact age of the coin, he entertains no doubt as to the head-dress representing woman's apparel that was worn by Euclid of Megara when on his way to and from the lectures of Socrates.

It is therefore established with as great certainty that this coin does not give the bust of the mathematician Euclid as it is established that this mathematician was not Euclid of Megara.

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RAINBOW BY MOONLIGHT

TO THE EDITOR OF SCIENCE: In connection with the case of the rainbow at night reported by Frank L. Griffin in SCIENCE of March 11, the following case may be of interest: At Burge, Nebraska, a rural post office about eighteen miles southwest of Valentine, on September 4, 1917, at about 9 P.M. a rainbow appeared. The moon had risen about an hour previously and a thunderstorm was coming up in the west, the rest of the sky being clear. A rainbow began to form and it continued to become brighter until a complete arch was formed. It was very distinct, but was nearly white and showed the prismatic colors very faintly if at all.

C. J. ELMORE

QUOTATIONS

BRITISH DYESTUFFS CORPORATION

THE situation in which the directorate of the British Dyestuffs Corporation finds itself is a remarkable one. At the registration of this company in May, 1919, as a result of amalgamating British Dyes, Ltd., of Huddersfield, with Messrs. Levinstein, Ltd., of Blackley, the appointment of Sir Joseph Turner as

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"Corolla Numismatica . . . in Honour of Barclay V. Head," Oxford University Press, 1906, pp. 368–386.

[2] "Historia Numorum, a Manual of Greek Numismatics," by Barclay V. Head, Oxford, 1911, p. 394.

[3] "Catalogue of Greek Coins, Attica—Megaris—Aegina," by Barclay V. Head, D.C.L., Ph.D. Edited by Reginald Stuart Poole, LL.D., London, 1888, p. 121. See a drawing of the coin in Attica, etc., Plate XXI., 14.

commercial managing director, and of Dr. Herbert Levinstein as technical managing director, was designed to maintain the interests of both groups, and to benefit the united enterprise by the special contribution of knowledge and experience which each of these gentlemen was expected to make. At the meeting of shareholders in Manchester on Friday last it was announced that Sir Joseph Turner and Dr. Levinstein, while retaining their seats on the board, have been superseded as managing directors by Sir Henry Birchenough, the chairman of the corporation, Sir William Alexander, and Mr. Vernon Clay.

It is no reflection on the new managing directors to express the opinion that the position thus disclosed must arouse grave misgiving amongst all those who recognize the foundation of a self-supporting synthetic dye-making industry as a matter of the greatest national importance. Disregarding the woeful absence of harmony which appears to be indicated, the aspect of this rearrangement which causes anxiety to chemists is the fact that, at a time when all the scientific knowledge and commercial energy available in this country should be correlated in a concerted effort to establish an industry which, more than any other, depends for success upon the combination of these factors, two of the most experienced practitioners should be removed from very intimate association therewith.

The proper and perfectly natural request for an investigation put forward by the shareholders met with a cold response from the board, and the declaration by the chairmen that a general meeting is not the occasion for an explanation of such peculiar circumstances is one with which many will sympathize; but the public is entitled to full information at the earliest convenient opportunity. Pending more precise knowledge of the facts, it would not be fair to the late managing directors, or to the board, to pass judgment on their action. If, however, as the published statements at present suggest, incompatibility of temperament is the cause, chemists will regard them as having failed in realizing their responsibility to science at a critical juncture; on the other hand, the board can scarcely escape the reproach of having allowed an impossible situation to continue far beyond the point at which a surgical operation had become an obvious necessity. Having regard to the immense scientific and national interests which are involved in the ultimate success of this enterprise, and to the large sum of public money which has been invested in the corporation, its future conduct demands very careful scrutiny.—*Nature.*

SCIENTIFIC BOOKS

Practical Plant Biochemistry. By Muriel Wheldale Onslow. Cambridge University Press, 1920. Royal 8vo, pp. viii + 178. Price 15s. net.

It is being recognized by students of the plant sciences that a thorough understanding of plant chemistry is essential to the solution of their problems. This knowledge has been usually obtained, on the one hand, from organic chemistry, and on the other, from plant physiology. It is the gap between these two sciences that this book is designed to fill. The author has made a real contribution to the study of plant chemistry. As in her former book on "The Anthocyanin Pigments of Plants," she has presented a very clear and comprehensive discussion; however, in the few pages of the present volume it is impossible to give more than a cursory discussion of the topic. The book is essentially a laboratory manual, which contains well-chosen experiments that have been tested in practical classes. Through these experiments the student learns to extract from the plant itself the chemical compounds of which it is composed and to understand something of their chemical properties. As an introduction to each chapter, there is presented the *fundamental* principles and relationships of the particular class of compounds studied in the experiments.

The volume is divided into the following chapters: I. Introduction. The synthesis of the various classes of compounds, and the chemical reactions by which they are brought

about, are discussed. II. The Colloidal State. It is appropriate that the book should begin with this topic, since it is essential for an understanding of the chemistry of cell protoplasm; but this is the least comprehensive and complete of any of the chapters. The two fundamental types of colloidal solutions, suspensoids and emulsoids, are treated and their characteristic properties illustrated. III. Enzyme Action. The underlying principles of enzyme action are briefly discussed and the behavior of different enzymes illustrated by those contained in yeast. The discussion of other enzymes follows in connection with those chapters dealing with the respective substrates. IV. Carbon Assimilation. It is emphasized that chlorophyll is perhaps the most important factor in plant metabolism. V. Carbohydrates and their Hydrolyzing Enzymes. Of all the subjects in plant chemistry which deserve careful treatment it is that of carbohydrates, and to it the author has devoted more space than to any other. There is a careful consideration of the properties and characteristics of the various carbohydrates, their synthesis and relationships in the plant. The monosaccharides, disaccharides and trisaccharides are most thoroughly treated, the latter under the following topics: pentosans, starches, dextrins, inulin, mannans, galactans, gums, mucilages, pectic substances and celluloses. VI. The Fats and Lipases. VII. Aromatic Compounds and Oxidizing Enzymes. The more widely distributed aromatic plant products are grouped: the phenols and their derivatives; the aromatic alcohols and acids including the tannins; the flavone, flavonol and xanthone pigments; and the anthocyanin pigments. The greater portion of the chapter is devoted to the plant pigments and oxidizing enzymes. VIII. Proteins and Proteases. The properties and chemical reactions by means of which the proteins can be detected are studied, and experiments follow which illustrate the method of extraction of the proteins from characteristic grains and seeds. IX. Glucosides and Glucoside-splitting Enzymes. Besides the glucosides of the pigments previously discussed the cyanophoric glucosides receive chief attention. X. The Plant Bases.

In the preface the author states that the book presents an aspect of plant biochemistry which up to the present time has received very little consideration in teaching. This is not entirely true in America, for at the University of Minnesota there have been offered for several years courses in phytochemistry and biochemical laboratory methods with particular reference to plant products. It is rather a coincidence that the subject matter of our courses should be similar, beginning with the colloidal state of matter and following with the classes of compounds found in plants. These courses through lectures and laboratory have presented to the student the same viewpoint for which this book was designed. Mrs. Onslow is to be commended for her pioneer work in the publication of a text on this important subject. From the mechanical standpoint the book is up to the usual standard of the publications of the Cambridge University Press. It is to be regretted, however, that in all probability the price will prevent it being used in many cases where it could profitably be employed.

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Anthropometry. By ALEŠ HRDLIČKA. Wistar Institute of Anatomy and Biology, Philadelphia. Pp. 163.

Anthropologists and all other workers who have occasion to make use of anthropometry have long been handicapped by the lack of any adequate and up-to-date manual of anthropometry. Now, at length, they have at their disposal a compact and comprehensive treatise on the subject written by one of the most experienced and competent investigators in the field, Dr. Aleš Hrdlička, curator of the Division of Physical Anthropology, U. S. National Museum. As a laboratory manual in physical anthropology and as a handbook for the use of field investigators of physical characters in man, this book should prove invaluable.

The work very properly begins with an annotated translation of the Monaco and Geneva Agreements for the Unification of Anthropometric Measurements. There follows a concise treatment of the preliminaries of the subject, such as preparation, instruments, landmarks, recording grouping of subjects, estimation of age, admixture of blood, pathological conditions, etc. The various topics are handled with clarity and include much original data in regard to general methods. There is a sane appraisal of the various anthropometric instruments and accessories employed in investigations.

The section on the anthropometry of the living deals with a selected list of the most important measurements and observations as determined by the experience of the author. The directions given are very clear and include many practical suggestions tending to promote facility of observation and accuracy of result.

The anthropometry of the skeleton is satisfactorily treated and includes a description of the invaluable system of visual observations elaborated by the author. In the opinion of the reviewer this standardization of morphological observations constitutes a contribution to anthropometric method of first importance, and the section dealing with it might advantageously be expanded. It is to be hoped that Dr. Hrdlička may find time to publish elsewhere a series of articles illustrating the normal or medium development of the various morphological characters and the extremes of their variations. Such illustrations, together with a discussion of the extent and significance of variations, would provide a standard basis for judging the degree of development of immensurable characters. At the present time the value of such observations is dependent upon the accuracy and experience of the individual investigator. It is becoming apparent to physical anthropologists that morphological differences of detail that do not lend themselves to measurement are of primary importance in distinguishing races. Many important functional adaptations belong also to this category of features which must be described rather than measured.

Perhaps it may be said that the greatest value of this work on anthropometry lies in the fact that it represents the perfected methods of one of the most skilled and best qualified practitioners of the science. Experts may differ as to the value of this or that measurement, or may prefer their own technique in individual cases, but this book is in general reliable and conclusive. A careful follower of its methods can not fail to secure completely adequate physical data in any general anthropometric investigation.

E. A. Hooton

Harvard University

SPECIAL ARTICLES

SUBEPITHELIAL GLYCOGEN CELLS IN EMBRYO AND RECENTLY HATCHED FISH

In April, 1912, while studying the development of the yellow perch (*Perca flavescens*) I discovered numerous cells filled with glycogen located just below the flat epithelium covering the surface of the embryo. The embryos in which I demonstrated these cells had been developing in the laboratory for twelve days. Upon the addition of a few drops of tincture of iodine to the water in the saucer in which the embryos were contained it was noticed, upon microscopical examination, that there were many round or oval cells, stained a reddish brown, scattered over the surface of the embryo, and especially marked in the fins. I have repeatedly studied these cells in the yellow perch and some other species of fish since I first observed them, and I have found them so interesting that I wish to make a record of some of my findings.

The embryos of the yellow perch are especially well adapted for microscopic examination, as they are exceedingly transparent, and retain their transparency to an advanced stage of development. The development of the eggs takes place rapidly at the ordinary temperature of the laboratory. At the end of the fourth or the beginning of the fifth day after the first division of the egg the embryo begins to make spontaneous movements of its body,

and the rudimentary heart commences to beat. No glycogen cells can be detected at this time, but about the beginning of the sixth day they appear as minute dark brown spots after the application of the dilute iodine solution. The glycogen cells increase in size and become more granular during the further development of the fish. At the time of the appearance of the cells the embryos are covered with a single layer of very thin flat epithelium. The intercellular substance of the epithelial cells can be easily and strikingly stained, after the application of a weak iodine solution and washing in water, by immersing the animal in a dilute aqueous solution of methylene blue for a short time. The blue staining fluid forms a dark precipitate with the iodine in the cement substance, and forms zigzag lines which delimit the cells in the clearest manner. The dark lines may be seen to cross the glycogen cells in many places, indicating that these cells are beneath the epithelial covering.

The glycogen cells are usually more or less elliptical and their dimensions vary with their stage of development. When they first appear their diameters may vary within the limits of 3μ and 10μ. At this time the protoplasm of the cells forms a ring surrounding a large central vacuole containing the glycogen granules. One part of the ring is usually thickened, and contains an elongated elliptical or crescentic nucleus. As the cells enlarge with the advanced development of the fish their vacuoles encroach on the protoplasm until the cells are converted into microscopic sacs of glycogen, in the walls of which a long elliptical or reniform nucleus can usually be found. At this stage the diameters of the cells may be 15μ to 25μ, and the granules, stained a mahogany color with iodine, are chiefly found just below the cell membrane. A number of these granules may coalesce and form a rod-shaped body in the interior of the cell. Sometimes three of the rods unite in the shape of a Y. The stained granules of glycogen dissolve with considerable rapidity in the water containing the preparation, and many of them disappear after a few minutes, leaving the thin cell membrane containing the nucleus. A very weak solution of iodine formed by adding a drop or two of the tincture to 5 c.c. of water gives the cells their characteristic color in a few seconds if the animal has been removed from the egg envelopes. If the embryos retain their gelatinous envelope they are stained in a few minutes, and it is easy to follow the gradual staining of the cells before the animals are killed by the iodine.

At the time of the first appearance of the glycogen cells there are no blood globules in circulation, but these are first seen a day or two later. At a little later period the liver is formed, and may be stained a brick red by the iodine solution. The liver cells do not contain glycogen granules but are diffusely stained a lighter and more reddish color than the subepithelial glycogen cells.

After a certain degree of development of the fish the number of the glycogen cells becomes gradually lessened by absorption. As I have had the perch under observation for only a limited time after hatching I have never witnessed the complete disappearance of the cells. In and after the third week of development their number becomes much smaller. At that time the glycogen cells of the tail may be crowded into its edge, and those of the pectoral fins arranged in columns radiating in the direction of the striation. This change in position is probably due to the growth of other tissue elements which displace the glycogen cells. In advanced development I have noticed in the tail fin many smaller mesoblastic cells which are not stained with iodine.

I have found many glycogen cells, very similar to those of the yellow perch, in recently hatched pike-perch or wall-eyed pike, and in the small-mouthed black bass, but some differences in the appearance of the cells in the different species, and in the solubility of their glycogen granules were noted. The glycogen cells of the pike-perch are coarsely granular, and their glycogen dissolves very rapidly in the dilute iodine solution. The nuclei of the cells are not so apparent as those of the yellow perch. The glycogen cells of the pike-perch may be seen under the

microscope as light spots without the iodine treatment, and an enormous number of the cells are scattered over the yolk sac. The cells of the small-mouthed black bass are large and contain much glycogen which dissolves very readily in water after iodine staining. I have noted in pike-perch which have been kept under observation for a considerable time that their glycogen cells become greatly diminished in number. I have not been successful in finding the glycogen cells in all species of fish. I have never been able to discover them in *Fundulus,* and have sought for them in vain in recently hatched smelt. They evidently act as temporary reservoirs of glycogen, but why they are present in some species of recently hatched fish, and not in others, is not apparent.

If it should be discovered that these peculiar cells can be isolated and satisfactorily cultivated in artificial media, they will offer most promising material for studying experimentally the formation of glycogen.

Frederick W. Ellis

Monson, Mass.,
August 23, 1920

THE OVARIAN CYCLE OF SWINE

Most of our information regarding the changes in the mammalian ovary during the various events of the reproductive cycle has been gained from study of the laboratory rodents and small carnivores. The domestic ungulates, on account of their large size and commercial value, have been neglected in this respect, although they promise certain advantages because of the simplicity of their ovarian structure and the regular, outspoken appearance of œstrus.

The only attempt to follow the history of the ripening follicles and the corpora lutea of an ungulate, with material of known history, is that recently published by Max Küpfer of Zurich,[1] who made use of the municipal abattoir of that city to procure a large series of ovaries of the cow. He was able to obtain records of the last appearance of œstrus in a certain number of animals (apparently 33) and has given a set of handsome plates illustrating the rise and retrogression of the corpus luteum. From the gross appearances and from measurements (no microscopic studies were made) Küpfer states that the interœstral period of 21 days may be divided into two parts. During the first 10–11 days after ovulation the corpus luteum is slowly reaching its full size, and thereafter it is in a state of retrogression which continues throughout the next interval, until by the time of the second following ovulation (42 days) the corpus luteum is macroscopically insignificant. The ovaries of animals undergoing uninterrupted œstrus cycles will therefore contain the follicles and corpora lutea of two or three periods, at successive stages of growth and retrogression.

The present writer has been endeavoring to piece out a similar account of the pig, in order to provide an anatomical basis for the physiological relations of ovary, ovum, and uterus in this species, and has published[2] a description of the mature follicles and developing corpora lutea up to the tenth or eleventh day, but has been unable, until the present, on account of conditions of the meat-packing trade, to follow the animals longer than this time. The lacking material has now been supplied, through the cooperation of Mr. W. N. Cooper, manager of the American Feeding Company of Baltimore, at whose large piggery farm a series of 22 sows has been obtained covering practically every day of the 21-day cycle.

The story as read from these specimens is a simple one, as will be seen from the accompanying diagram. It appears that mature ovaries of non-pregnant animals contain a reserve stock of follicles of 5 mm. diameter or

[1] Küpfer, Max, "Beiträge zur Morphologie der weiblichen Geschlechtsorgane bei den Säugetieren," *Denksschr. d. Schweiz. Naturf. Gesellsch.*, 1920, Bd. LVI.

[2] Corner, G. W., "On the origin of the corpus luteum of the sow from both granulosa and theca interna," *Amer. Jour. Anat.*, 1920, Vol. 26, pp. 117–183.

less. One or two days before the onset of œstrus some of the follicles rapidly enlarge to the full diameter of 7 to 10 mm., and the enclosed ova pass through the preliminary stages of maturation. Ovulation occurs on the second of the three days of œstrus; the ova are three days en route through the Fallopian tube and pass into the uterus on the fourth day. If not fertilized they degenerate in utero about the seventh or eighth day after ovulation. The corpora lutea, as already described, reach full histological complexity about the seventh day, by which time they have attained a diameter of 9 mm. The new specimens show that they remain in a state of full development, without obvious further change, until the fourteenth or fifteenth day after discharge of the follicles, and then begin a retrogression which is initiated by a sudden disintegration of the granulosa lutein cells, which have formed the chief bulk of the organ. In a few days more the corpora consist only of connective tissue containing in its meshes a few lipoid-laden cells; and by the time of the next ovulation they have diminished in size to a diameter of 6 mm. During the second interœstral interval after their formation they shrink still further, until at the age of 40 days they are but 2 or 2.5 mm. in diameter. After this they are not readily distinguishable from other ovarian tissues in the gross, and microscopically are so far degenerated that one does not feel able to separate them from atretic follicles.

When the pig's ova are fertilized, the embryos gain attachment to the uterine wall between the tenth and fifteenth day after ovulation. It is a most important fact, therefore, that the corpus luteum persists until the fourteenth or fifteenth day, for this finding harmonizes with the current hypothesis that the corpus luteum exercises an effect upon the uterus, preparing it for implantation. The duration of the corpus luteum is quite variable in different species, but in none has it been found less than the time required for attachment of the embryos. Another supposition with regard to the function of the corpus luteum, that it serves, while present, to restrain the growth of follicles, is also borne out by our observations, as far as they go, for it will be noticed that a new group of follicles passes beyond the resting dimension only after the degeneration of the last corpora is under way.

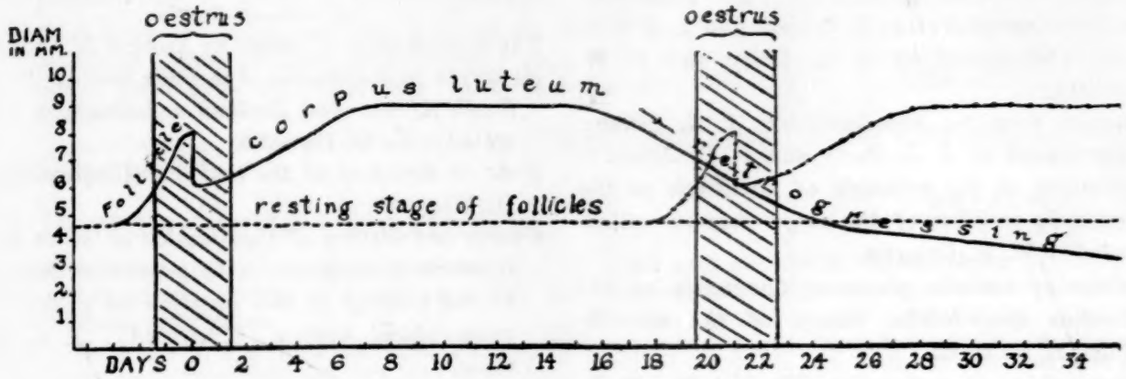

FIG. 1.
Diagram representing the ovarian cycle of the nonpregnant sow.

A full account of these studies will form part of a monograph on cyclic changes in the ovaries and uterus of the pig, now in preparation.

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THE NATIONAL ACADEMY OF SCIENCES

THE annual meeting of the National Academy of Sciences was held at the Natural History Building, U. S. National Museum, in Washington on April 25, 26 and 27, 1921.

The preliminary program of scientific sessions open to the public follows.

MONDAY, APRIL 25

Afternoon Session

Ultimate rational units (illustrated): GILBERT N. LEWIS.

The quantum law and the Doppler effect: WILLIAM DUANE.

Preliminary measurements of the effect of high pressures on the thermal conductivities of liquids (illustrated): P. W. BRIDGMAN.

The stratification of suspended particles (illustrated): C. E. MENDENHALL and MAX MASON.

Transmission characteristics of the submarine cable (illustrated): J. R. CARSON and J. J. GILBERT (introduced by J. J. Carty and F. B. Jewett).

Radiation from transmission lines: J. R. CARSON (introduced by J. J. Carty and F. B. Jewett).

Application of the principle of similitude to the hydraulic problem of the surge chamber (illustrated): W. F. DURAND.

Theories of osmotic pressure; Comments on the Borelius space-lattice theory of the metallic state: E. H. HALL.

Metamorphism in meteorites (illustrated): G. P. MERRILL (introduced by Whitman Cross).

The Island of Tagula (New Guinea), its satellites and coral reefs; The shallow seas of Australasia: W. M. DAVIS.

On the radiation of energy from coils in wireless telegraphy; On the vibrations of gun-barrels; On the problem of steering an automobile around a corner: A. G. WEBSTER.

Evening Session

Address by His Serene Highness Albert I., Prince of Monaco, Agassiz medalist, Auditorium U. S. National Museum. Reception to the Prince, Galleries, U. S. National Museum.

TUESDAY, APRIL 26

Morning Session

A model of the solar gravitational field: EDWARD KASNER.

On the problem of three or more bodies: GEORGE D. BIRKHOFF.

Quaternions and their generalizations: L. E. DICKSON.

Investigations in algebra and number theory: L. E. DICKSON.

On the approximate solutions in integers of a set of linear equations: H. F. BLICHFELDT.

A provisional theory of new stars: H. N. RUSSELL.

The compilation of star catalogues by means of a doublet camera (illustrated): F. SCHLESINGER.

The National Research Council: VERNON KELLOGG.

The order of the stars (illustrated): W. S. ADAMS.

Cooking with solar heat on Mt. Wilson (illustrated): C. G. ABBOT.

The evolution of matter: F. W. CLARKE.

The differences between variable series: FRANZ BOAS.

Life of James Hall, of Albany, geologist and paleontologist, 1811–1890 (by title): J. M. CLARKE.

Afternoon Session

The classification of animals: AUSTIN H. CLARK.

Attempts to acclimatize Aphelinus mali in France, South Africa, New Zealand and Uruguay (illustrated): L. O. HOWARD.

Note on structure of the trilobite (illustrated): C. D. WALCOTT.

Origin and history of the Ursidae or bears in the Western Hemisphere, with particular reference to the bearing of this question on problems of geographical history (illustrated): J. C. MERRIAM.

The evolution, phylogeny and classification of the Proboscidea (illustrated): H. F. OSBORN.

Experiments in epidemiology: SIMON FLEXNER.

Effect of administering various simple metabolites upon the heat production of the dog (illustrated): GRAHAM LUSK.

The physical and chemical behavior of proteins (illustrated): JACQUES LOEB.

The skin temperature of Pachyderms (illustrated): FRANCIS G. BENEDICT, EDWARD L. FOX and MARION L. BAKER.

The temperature factor in phytopathology (illustrated): L. R. JONES.

Results of feeding experiments with mixtures of food stuffs in unusual proportions (illustrated): T. B. OSBORNE and L. B. MENDEL.

Population (illustrated): C. B. DAVENPORT.

Measuring higher grades of intelligence: E. L. THORNDIKE.

A study of specific forces of mortality: RAYMOND PEARL and CHARMIAN HOWELL.

C. G. ABBOT,
Home Secretary
SMITHSONIAN INSTITUTION,
WASHINGTON